

CLAIMS

1. A preform for a container comprised of orientable plastics material and arranged so that the resultant blown container will include a hollow handle; said preform comprising a moulded structure having a neck portion and an expandable portion below the neck, a hollow handle portion of orientable plastics material integrally connected at least at a first end to said preform which when the container is formed constitutes said handle, and wherein interior surfaces of said hollow handle portion form a continuum with interior surfaces of said expandable portion.
2. A method of moulding a preform comprising a neck portion, a substantially cylindrical expandable body portion and a hollow handle portion integrally connected at least at one point to said expandable body portion; said method comprising the steps of:
 - (a) preparing an injection moulding die in which the exterior form of said body portion and said handle portion of said preform are defined by a cavity formed by cooperating halves of said injection die,
 - (b) preparing a main body forming mandrel for insertion into said cavity; said mandrel

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provided at an outer end with a control module,

(c) providing a passage extending from said control module substantially centrally through said mandrel; said passage curving to emerge at a side of said mandrel opposite said at least one point,

(d) providing a flexible handle mandrel controlled by said control module; said mandrel adapted for insertion through said passage and into said handle portion of said cavity.

3. The method of claim 2 wherein said flexible mandrel is an inflatable flexible tube of heat resistant material.
4. The method of claim 2 or 3 wherein said tube is sealed at an outer end.
5. The method of claim 4 wherein said outer end is provided with a solid tip projecting through said outer end.
6. The method of claim 5 wherein said tip is of substantially cylindrical form, said tip oriented with its axis substantially aligned with the axis of said tube.
7. The method of claim 5 or 6 wherein the diameter of said tip defines the diameter of the interior of the hollow handle when formed.

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8. The method of any one of claims 3 to 7 wherein a cable extends through said tube from said control module to said tip.
9. The method of any one of claims 3 to 8 wherein said control module is adapted to extend and retract said tube.
10. The method of any one of claims 3 to 9 wherein said control module is adapted to inflate and deflate said tube.
11. The method of any one of claims 5 to 10 wherein said method for moulding a preform with a hollow handle attached at one point to said body comprises the further steps of:
 - (a) providing a first injection gate at an outer end of said handle portion of said cavity,
 - (b) inflating said tube so as to completely fill said handle portion of said cavity,
 - (c) injecting a flowable plastic material through said gate so as to envelop said tip,
 - (d) arranging said control module to partially deflate said tube,
 - (e) arranging said control module to gradually withdraw said tube from said handle portion of said cavity at a rate commensurate with the injection rate of said flowable material,
 - (f) injecting said flowable material through a second injection gate at an outer end of said

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body portion of said cavity,

- (g) continuing injection of flowable material through both gates until said tip bridges a gap between said handle portion and said main body forming mandrel,
- (h) withdrawing said tube and said tip into said main body forming mandrel,
- (i) continuing injection of flowable material to completely fill said cavity.

12. The method of any one of claims 5 to 10 wherein said method for moulding a preform with a hollow handle connected at two points to said body; said handle extending from a first connection point to a second connection point, said method comprises the further steps of:

- (a) providing a pocket for nesting said tip in said main body mandrel opposite said second connection point,
- (b) inserting said tube through said handle portion of said cavity to nest said tube in said pocket,
- (c) inflating said tube,
- (d) injecting flowable material through an injection gate at an outer end of said main body portion of said cavity,
- (e) continuing said injection of flowable material until said material envelops said

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tip,

- (f) gradually withdrawing said tube commensurate with a rate of injection of said flowable material so as to maintain said tip enveloped by said material,
- (g) pausing withdrawal of said tube when said tip bridges a gap between said handle portion and said main body forming mandrel at said first connection point,
- (h) withdrawing said tube and said tip into said main body forming mandrel,
- (i) continuing injection of flowable material to completely fill said cavity.

13. A method of forming a container of plastic material having an integral hollow handle; said method comprising:

- (a) forming a preform according to any one of claims 2 to 12, having a neck portion and an expandable portion below the neck portion, said preform having a hollow handle portion integrally connected at least at a first end to said preform, and
- (b) preheating said preform to condition said plastic material,
- (c) performing a blow moulding operation on said preform to expand the expandable portion and

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said handle portion to form the body and handle of said container.

14. A container provided with a hollow handle, said handle integrally connected to at one point to said container, said container formed by stretch blow-moulding from a preform according to any one of claims 2 to 11, wherein an outer end of said handle is separated by a gap from said container.
15. A container provided with a hollow handle, said handle integrally connected at least at one point to said container, said container formed by stretch blow-moulding from a preform according to any one of claims 2 to 11, wherein an outer end of said handle is adapted for at least partial capture within a portion of a wall of said container when said container is stretch blow-moulded from said preform.
16. A container provided with a hollow handle, said handle integrally connected to said container at a first point and a second point so as to allow the insertion of the fingers of a hand of a user, said container formed by stretch blow-moulding from a preform according to claim 12.

B & R Industries Pty Ltd

By their Patent Attorneys

Wallington-Dummer